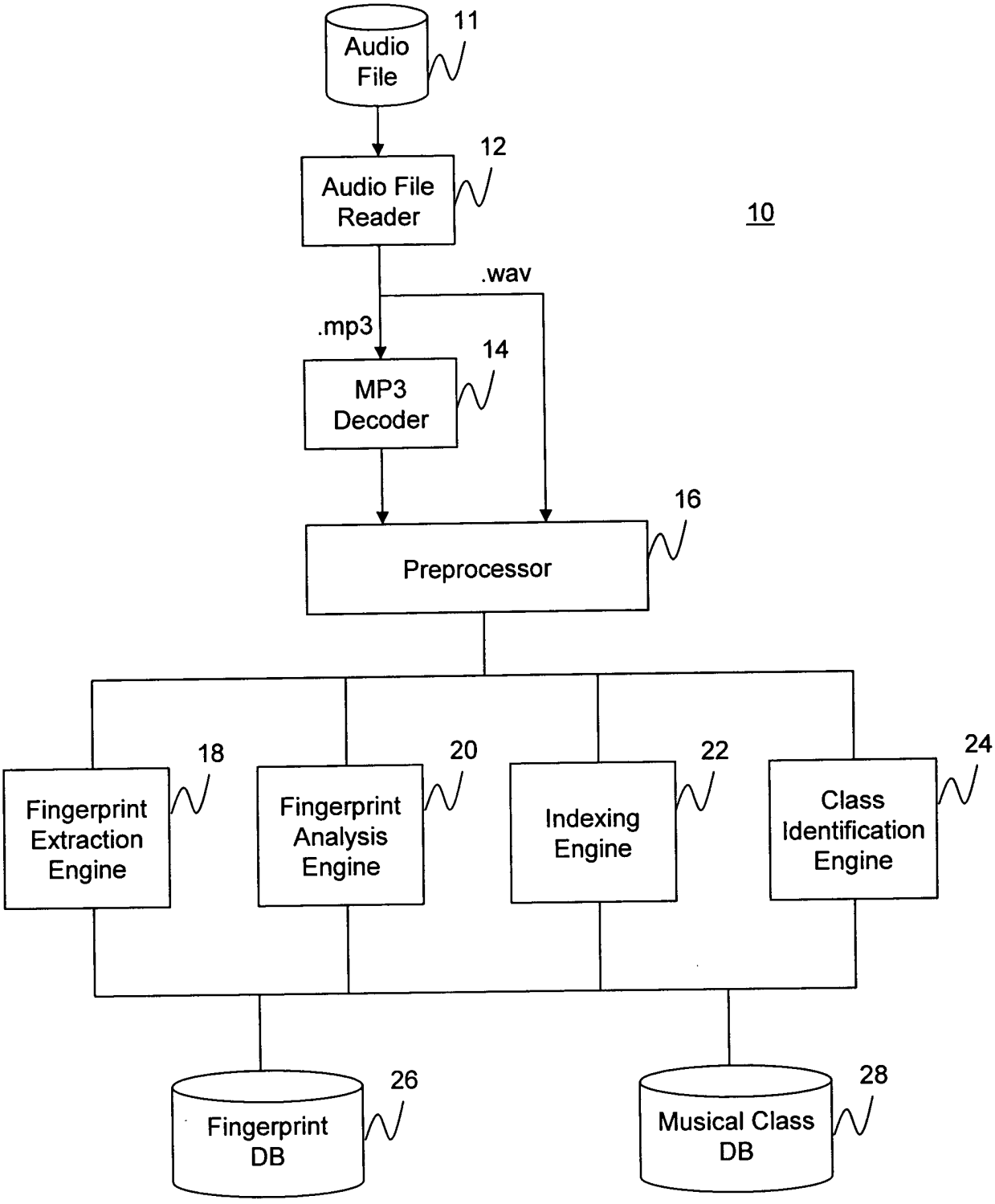
Audio File
11
Audio File Reader
12
10
.wav
.mp3
MP3 Decoder
14
Preprocessor
16
Fingerprint Extraction Engine
18
Fingerprint Analysis Engine
20
Indexing Engine
22
Class Identification Engine
24
Fingerprint DB
26
Musical Class DB
28

FIG. 1

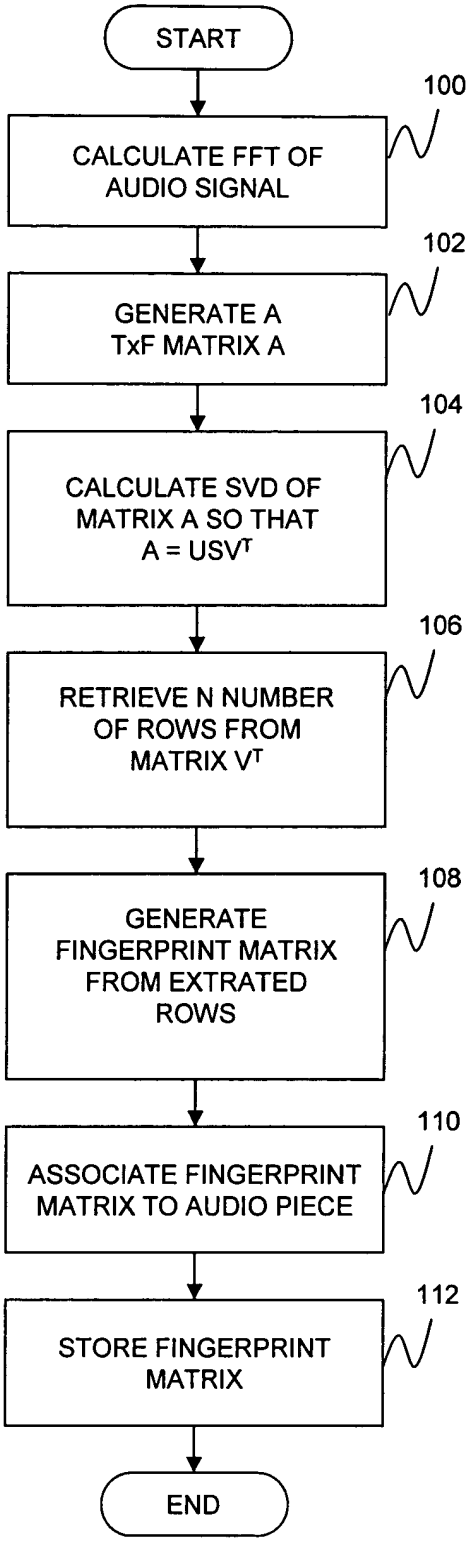
START
100
CALCULATE FFT OF AUDIO SIGNAL
102
GENERATE A TxF MATRIX A
104
CALCULATE SVD OF MATRIX A SO THAT A = USV^T
106
RETRIEVE N NUMBER OF ROWS FROM MATRIX V^T
108
GENERATE FINGERPRINT MATRIX FROM EXTRATED ROWS
110
ASSOCIATE FINGERPRINT MATRIX TO AUDIO PIECE
112
STORE FINGERPRINT MATRIX
END

FIG. 2

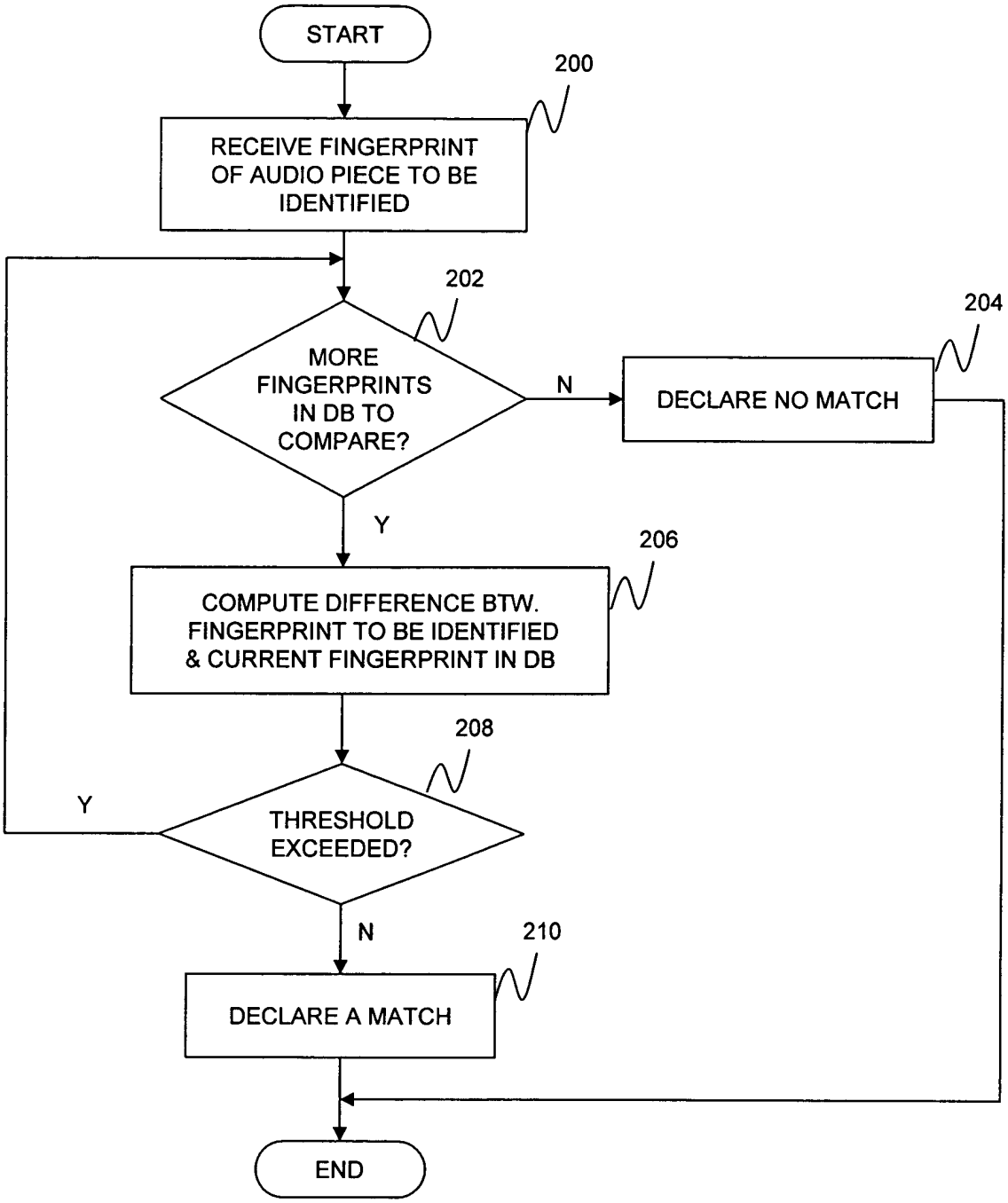
START
200
RECEIVE FINGERPRINT OF AUDIO PIECE TO BE IDENTIFIED
202
MORE FINGERPRINTS IN DB TO COMPARE?
N
204
DECLARE NO MATCH
Y
206
COMPUTE DIFFERENCE BTW. FINGERPRINT TO BE IDENTIFIED & CURRENT FINGERPRINT IN DB
208
Y
THRESHOLD EXCEEDED?
N
210
DECLARE A MATCH
END

FIG. 3

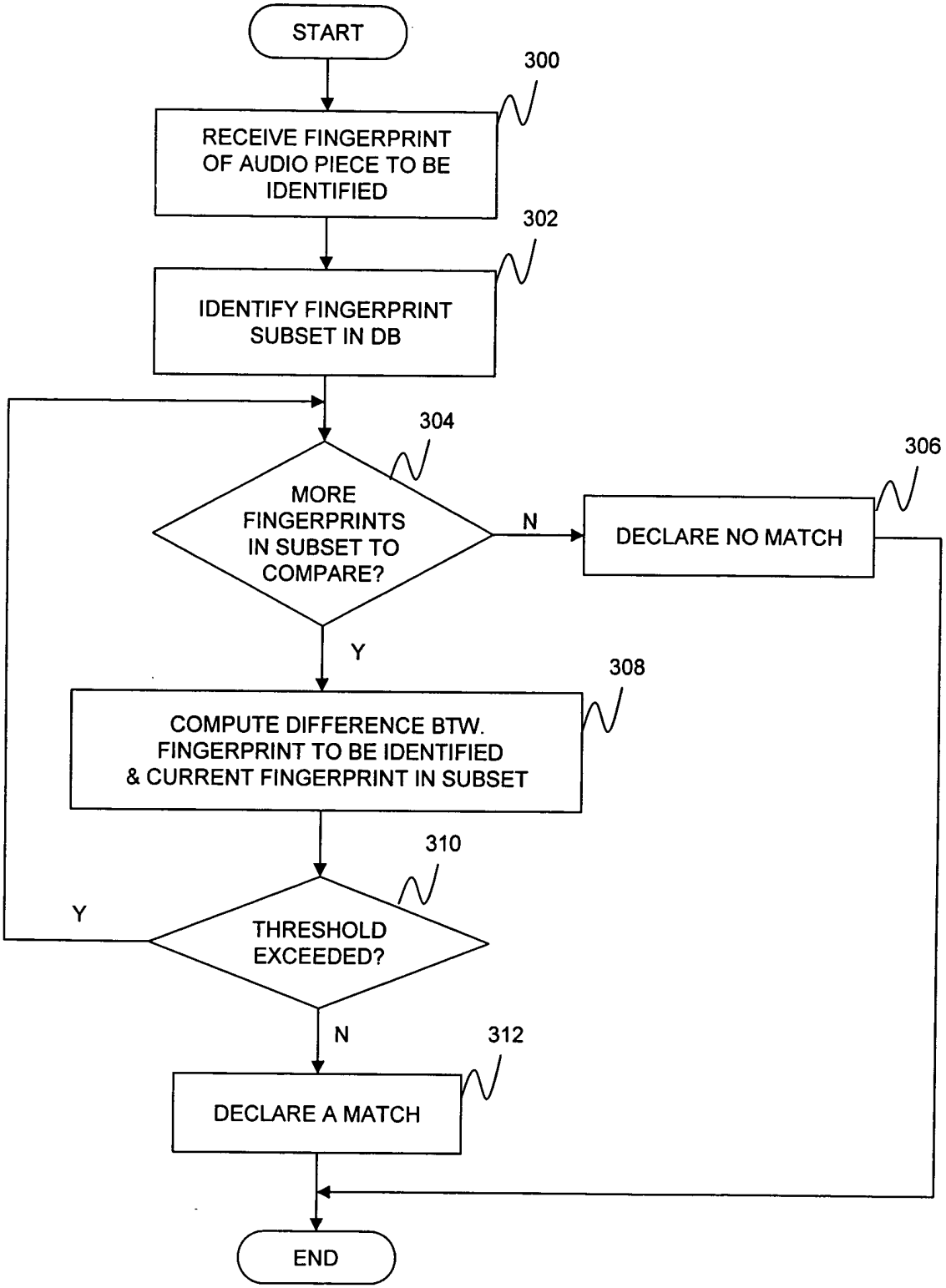
START
300
RECEIVE FINGERPRINT OF AUDIO PIECE TO BE IDENTIFIED
302
IDENTIFY FINGERPRINT SUBSET IN DB
304
MORE FINGERPRINTS IN SUBSET TO COMPARE?
N
306
DECLARE NO MATCH
Y
308
COMPUTE DIFFERENCE BTW. FINGERPRINT TO BE IDENTIFIED & CURRENT FINGERPRINT IN SUBSET
310
THRESHOLD EXCEEDED?
Y
N
312
DECLARE A MATCH
END

FIG. 4

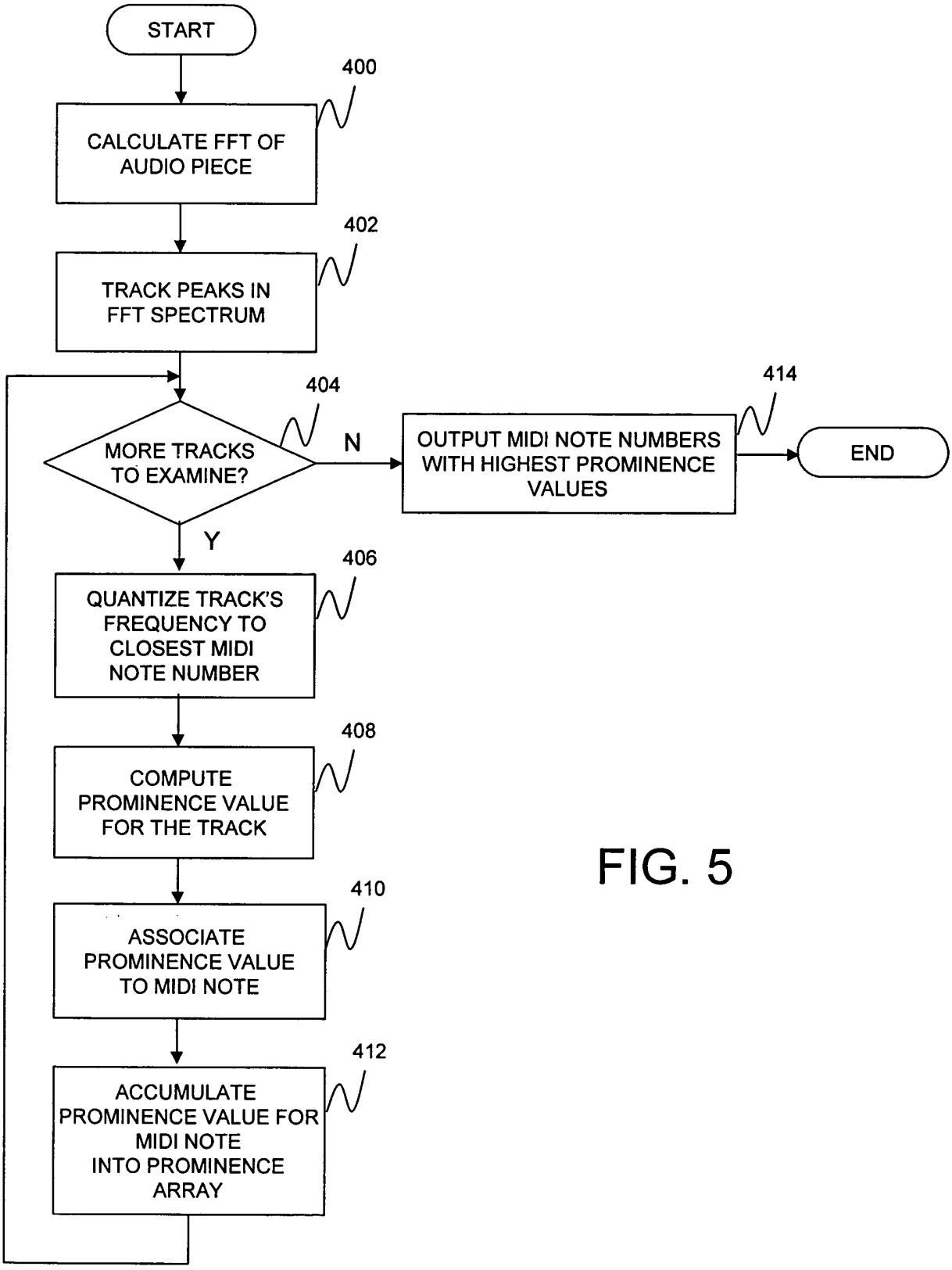
START
400
CALCULATE FFT OF AUDIO PIECE
402
TRACK PEAKS IN FFT SPECTRUM
404
MORE TRACKS TO EXAMINE?
N
414
OUTPUT MIDI NOTE NUMBERS WITH HIGHEST PROMINENCE VALUES
END
Y
406
QUANTIZE TRACK'S FREQUENCY TO CLOSEST MIDI NOTE NUMBER
408
COMPUTE PROMINENCE VALUE FOR THE TRACK
410
ASSOCIATE PROMINENCE VALUE TO MIDI NOTE
412
ACCUMULATE PROMINENCE VALUE FOR MIDI NOTE INTO PROMINENCE ARRAY

FIG. 5

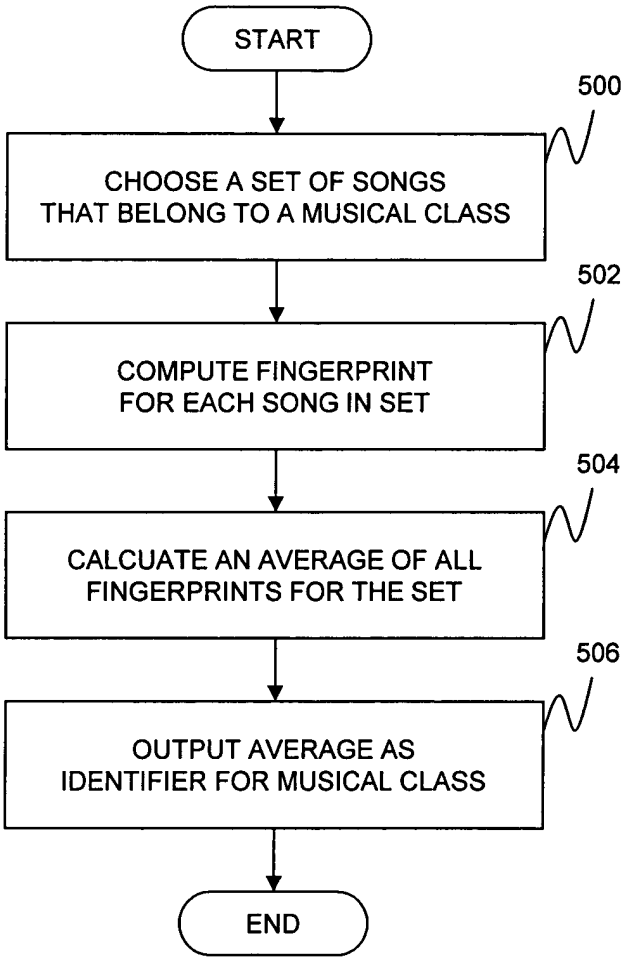
START
500
CHOOSE A SET OF SONGS THAT BELONG TO A MUSICAL CLASS
502
COMPUTE FINGERPRINT FOR EACH SONG IN SET
504
CALCUATE AN AVERAGE OF ALL FINGERPRINTS FOR THE SET
506
OUTPUT AVERAGE AS IDENTIFIER FOR MUSICAL CLASS
END

FIG. 6

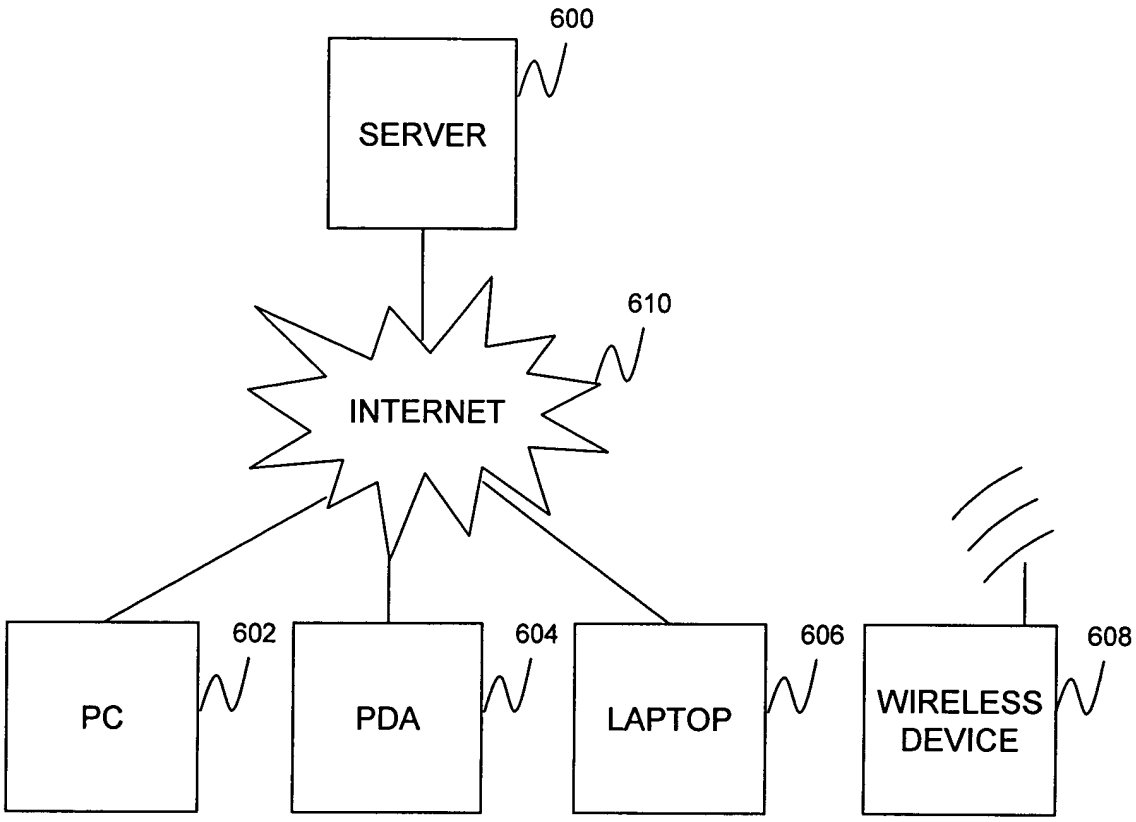
600
SERVER
610
INTERNET
602
PC
604
PDA
606
LAPTOP
608
WIRELESS DEVICE

FIG. 7